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APPLICABILITY OF ERTS FOR SURVEYING

ANTARCTIC ICEBERG RESOURCES

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APPLICABILITY OF ERTS FOR SURVEYING
ANTARCTIC ICEBERG RESOURCES

(MMC#059, NAS5-21905)

First Progress Report, February-April 1973

John L. Hult (PR101)

The contract, NAS5-21905, became effective 9 February 1973 after most of the Antarctic daylight season was over, and after much of the originally requested imagery had been taken (started 16 November). The delay in contracting confused and delayed the delivery of imagery and gave little opportunity to modify the request for imagery based on early results. The extent to which cloud cover prevails over the Antarctic seas was not anticipated nor the volume of imagery required to obtain the desired information under these conditions. A formidable problem of handling, cataloging, displaying, and correlating thousands of images required early solution. The original concept for this investigation was to focus attention on a test sector in western Antarctica to establish methods, techniques and potential applications to the Pacific. It was then contemplated that the investigation could be extended over seasons and to the rest of Antarctica with ERTS-B. However, ERTS-B has been postponed and recorder difficulties will probably not permit the acquisition of significant additional Antarctic imagery after March 1973 from ERTS-1. A perusal of the Non-U.S. Standard Catalogs of ERTS images reveals that a considerable sampling of Antarctica outside of our originally defined test site has been made, which may permit us to extend and complete our analysis even though our requested imagery and planned extension have been cut short. This investigation is supported primarily by NSF and sources outside of NASA so we do not anticipate requesting additional funding from NASA if we can obtain the imagery in time so that it will not require much additional reporting to NASA beyond that originally planned.

Accomplishments

A Data Analysis Plan was submitted to NASA on 21 February 1973 and notice of approval and authorization to proceed with Phase III of the contract (dated 8 March 1973) was received. We have devised suitable methods of cataloging and displaying the inventory of imagery that we receive so that it can be accumulated, correlated, and analyzed efficiently. The original test sector is partitioned geographically along orbital parallels into six sections, and much of the changing data such as sea ice coverage and cloud cover are being partitioned chronologically into four periods. The imagery received to date reveals a good geographical sampling of the test sector and good initial time sampling, although it is not yet known whether an adequate sampling was made during the latter part of the season.

ERTS image descriptor forms for about 500 images have been completed and submitted during the period, and data requests have been made for about 60 retrospective bulk-product images. About 350 bulk images of Antarctic coastal and sea areas outside of our original test area have been requested from the N-5 and N-6 catalogs.

During the coming period we should receive the remainder of our standing order images and most of our data requests. If we receive this information in a timely manner, we should be able to complete the investigation by July including any useful information obtained from imagery outside of our standing orders and test site. This should include cloud cover statistics in Antarctica, sea ice contours and behavior with time, considerable new information on coastal topography and ice shelves, and as significant a sampling of iceberg characteristics as can be obtained from the available data.

Significant Results

A preliminary analysis of cloud cover during the first few months of imagery reveals that over 0.6 of the images have more than 90 percent cloud cover. Many images have translucent cover that permits the interpretation of many features about sea ice or Antarctic topography, but that obscures the possibility of measuring detailed iceberg characteristics. If the cloud cover is greater than 90 percent, but useful information

for this investigation about sea ice or topography is obtainable, an image is arbitrarily classified with 90 percent cloud cover. About 0.4 of the standing order images obtained so far have full cloud coverage with no useful information for our investigation about sea ice, icebergs or topography. No descriptor forms for these images will be prepared.

Recognition and interpretation of icebergs proves to be easy when they are locked in sea or fast ice. They stand out in relief, particularly well in band 7. Recognition of isolated icebergs is much more difficult. Size, shape, interaction with sea ice, and change over time must then be used to help in positive identification. There seems to be much less current and relative motion between icebergs and sea ice in much of the test sector than we had been lead to believe from available exploration information. However, most of this type of assessment must await the accumulation and analysis of the full season data.

Recommendations

There will probably be no opportunity to obtain further imagery of the Antarctic for about three years. However, much imagery of the Antarctic outside of our initial test site including some coverage of sea and ice shelf areas was apparently obtained during the past season. Therefore we recommend that the responses to our requests for bulk imagery from this outside coverage selected from the most promising listings in the catalogs be expedited so that its analysis can be included and combined with our originally planned effort at no increase in contract costs to NASA.

ERTS Image Descriptor Forms

Image descriptor forms submitted during this period cover about 500 images that are useful to the investigation. Three frequently used descriptors were devised that should be easy to find in any listing and that should help in any search for specific details of interest. ~~_____~~
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Data Requests

Data request forms submitted 22 February 1973 requested 19 Bulk B&W 70-mm positive transparencies for detailed analysis of iceberg characteristics; three Bulk Color 9.5-in. positive transparencies for detailed analysis of iceberg characteristics in a colored background; three Bulk Color 9.5-in. paper prints to determine the value of color in interpretation for scenes with greatest potential in this investigation; and 12 images from the N-4 catalog involving sea or coastal coverage of Antarctica outside of our test site. Data request forms were submitted on 10 April and on 26 April for 15-Bulk B&W 70-mm positive transparencies for detailed analysis of iceberg characteristics, and for more than 300 images of greatest promise from sea or coastal coverage of Antarctica outside of our test site from the N-5 and N-6 catalogs. Additional requests will be made when new catalogs are received and in retrospect from suitable imagery that is received.